

Effects of Task Difficulty and Interest on Mind Wandering while Reading (#10446)

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Author(s)

Erik Bijleveld (Radboud University Nijmegen) - e.bijleveld@psych.ru.nl

Yeism Ozuer (Radboud University Nijmegen) - yesim.ozuer@gmail.com

Rebecca Kahmann (Radboud University Nijmegen) - r.kahmann@student.ru.nl

1) Have any data been collected for this study already?

No, no data have been collected for this study yet.

2) What's the main question being asked or hypothesis being tested in this study?

Mind wandering has a U-shaped curvilinear relationship with text difficulty. Therefore, mind wandering rises at low and high levels of text difficulty and has its lowest point at one of the moderate levels of text difficulty.

3) Describe the key dependent variable(s) specifying how they will be measured.

The key dependent variable is mind wandering which will be measured by experience sampling. Thought probes at random intervals will require the participants to determine whether they are currently mind wandering (yes) or not (no).

4) How many and which conditions will participants be assigned to?

There will be 5 within-subjects conditions of text difficulty:

1. Very low 2. Low 3. Moderate 4. High 5. very high

5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.

A generalized logistic-mixed-effects model approach will be used to analyze the data, using the lme4 package in R (Bates, Maechler, Bolker, & Walker, 2015; R Core Team, 2017).

The model will include a fixed intercept, a fixed main effect for text difficulty (linear), and a fixed main effect for text difficulty (quadratic). To take into account that some people may generally mind wander more than others, our model will include per-participant adjustment to the intercept (i.e., a random intercept). To take into account that some people may be more responsive to the difficulty manipulation, we will include per-participant adjustments to the linear and quadratic effects of text difficulty (i.e., random slopes). To take into account that either of the text topics may generally be more conducive to mind wandering, we will include a per-topic adjustment to the intercept (i.e., a random intercept). Finally, our model will include all random correlations among the random effects.

These considerations lead to the following model:

```
Model <- glmer(mindwandering ~ difficulty_linear + difficulty_quadratic + (1+ difficulty_linear + difficulty_quadratic | subject) + (1 | topic), data=Data, family=binomial)
```

If this model does not converge, the guidelines described by Barr et al. (2013) will be followed.

6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.

Pre-exclusion criteria: people with English as their first language and people younger than 18 or older than 30 are not allowed to participate.

Post-exclusion criteria:

- Overall MW proportions above 90% and below 10%

- If in 90% or above of interest and difficulty rating, same answer is provided

- If the same answer option in the text comprehension test is used in 90% of the cases or above, these cases will be excluded from the analyses belonging to point 6B.

7) How many observations will be collected or what will determine sample size? No need to justify decision, but be precise about exactly how the number will be determined.

The aimed sample size for this study consists of 80 participants (estimated as sufficient with simulations based on effect sizes reported by Feng et al. (2013)). If, however, this value will not be reached until 31st of May, we will conduct the data analysis with the sample size that we were able to obtain until this date.

8) Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)

A. We will test whether interest moderates the relationship between text difficulty and mind wandering. We expect that as the interest in the text content increases, the effect of text difficulty on mind wandering decreases. Therefore, the glmer model from point 5 will be extended with the fixed effect of interest and the interaction between interest and the quadratic predictor of text difficulty and the corresponding random slopes. The resulting model is then:

```
Model2 <- glmer(mindwandering ~ difficulty_linear + difficulty_quadratic*interest + (1+ difficulty_linear + difficulty_quadratic*interest | subject) + (1 |
```

topic), data=Data, family=binomial)

B. Furthermore, we will try to replicate the previous finding that the proportion of mind wandering has a detrimental effect on text comprehension as it is often suggested in previous research with a linear regression analysis (e.g. Feng et al., 2013; Smallwood & Schooler, 2012). If we can replicate these previous results, we will investigate whether the relationship between mind wandering and text comprehension changes as a function of text difficulty.